

Distance Learning Programme : An initiative by AEES, MUMBAI

CLASS XI-MATHEMATICS

CHAPTER 7

PERMUTATIONS AND COMBINATIONS

HANDOUT OF MODULE-1/3

**1.ADDITION PRINCIPLE OF COUNTING:**

If an event can be performed in 'm' different ways and another event in 'n' different ways then the number of ways in which either of the two events can be performed is 'm+n' ways.

**2.THE FUNDAMENTAL PRINCIPLE OF COUNTING:**

“ If an event can occur in m different ways ,following which another event can occur in n different ways,then the total number of occurrence of the events in the given order is  $m \times n$ ”.

**For more than two events,**“ If an event can occur in m different ways, following which another event can occur in n different ways, following which a third event can occur in p ways, then the total number of occurrence of the events in the given order is  $m \times n \times p$ ”

Examples:

1. A suit case has a number lock with 4 wheels each labelled with 10 rings and the digits varies from 0 to 9. The lock can be opened if 4 specific digits are arranged in a particular sequence. Find the number of attempts that can be made, if

- (a) Repetition of digits is allowed.
- (b) Repetition of digits is not allowed.

Ans :

(a) As the repetition of digits is allowed, each wheel can be chosen from 10 rings.

Then the number of ways is  $10 \times 10 \times 10 \times 10 = 10^4$

(b) Repetitions are not allowed, the first wheel can be chosen from 10 rings, the second wheel from 9 rings, third wheel from 8 rings and fourth wheel from 7 rings.

The number of ways of opening the number lock is  $10 \times 9 \times 8 \times 7 = 5040$

2. Find the number of different signals that can be generated by arranging 2 flags, one below the other out of 5 different flags?

Ans: The number of ways in which one flag can be selected out of 5 flags is 5 and the number of ways in which second flag can be selected out of the remaining flags is 4. Hence the total number of signals that can be generated if these two flags can be placed one below the other is  $5 \times 4 = 20$ .

3. There are four bus routes between A and B, and three bus routes between B and C.

A man can travel round-trip in number of ways by bus from A to C via B. If he does not want to use a bus route more than once. In how many ways can he make round trip?

Ans: There are 4 bus routes from A to B and 3 routes from B and C. Therefore, there are  $4 \times 3 = 12$  ways to go from A to C. It is round trip so the man will travel back from C to A via B. It is restricted that man can not use same bus routes from C to B and B to A more than once. Thus, there are  $2 \times 3 = 6$  routes for return journey. Therefore, the required number of ways =  $12 \times 6 = 72$ .